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REMARKS

The Applicant thanks the Examiner for indicating that claims 11-20 are allowed. As claim 21 is not rejected on any grounds and as this claim depends directly from allowed claim 20, the Applicant believes claim 21 is allowable as well.

Claims 1, 2 and 4 are rejected, under 35 U.S.C. § 103, as being unpatentable over Beck '372 in view of Anderson '097. The Applicant acknowledges and respectfully traverses the raised obviousness rejection in view of the following remarks.

As previously noted, the present invention is directed at a laminated composite structure for producing a high acoustical performance instrument, such as a drum or a string instrument, which has noticeable sound improvement over prior art drum and string instruments, e.g., improved acoustic resonance, improved sustained sound, improved sound amplitude, and improved structural integrity. The improved acoustical performance has (a) improved dimensional stability for the laminated composite structure, whether it is a percussion instrument, a string instrument or a piece of furniture; as well as (b) improved longevity and performance stability for the laminated composite structure. The improved dimensional stability for the laminate imparts a reduction in localized stresses within the laminate structure and thus creates an internal equilibrium within the laminate. The improved longevity and performance stability of the laminate are a result of not only a creation of the internal equilibrium within the structure, but also, due to the selection of the additive type, the quantity and *most importantly, the particle size for the hollow spheres contained within the laminate.*

Turning now to the applied prior art reference of Beck '372, this reference relates to a low density space filling material. This sheet comprises a flexible carrier web 42 and a mono-layer of larger low density filler bodies 48 which are adhered to at least one side of the carrier web 48. The larger low density filler bodies 48 are discrete hollow spheres that are made up of smaller hollow micro spheres 26.

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As shown in Fig. 9 of Beck '372, this drawing shows a 9 centimeter pipe section made with a first layer of glass fiber material 65 and then a sheet of the low density space filling material 66 and finally another layer of glass fiber 67. The entire assembly is then impregnated with an epoxy-resin-based composition. The discrete larger hollow spheres 48, as specifically taught and disclosed by Beck '372, are anywhere from 1/2-20 millimeters in diameter (see column 1, line 29; column 6, line 4, for example) and are from 1-20 millimeters in diameter, as specifically recited in the claims. The Applicant respectfully submits that such large particle size hollow spheres may eventually lead to crack propagation and/or early deterioration of the system. In any event, this reference clearly fails to in any way teach, suggest or disclose the presently claimed invention having at least three layers of laminate with an adhesive layer located between the first and the second layers of laminate and between the second and the third layers of laminate where all of the hollow spheres in the composite adhesive have a diameter of less than 500 microns, as presently recited.

Next, the Applicant respectfully submits that the combination of Beck '372 and Anderson '097 is improper and inappropriate as these two references are distinctly different in their specific teachings of hollow spheres and the uses thereof.

The hollow spheres, according to the presently claimed invention, are by no means incorporated into the adhesive matrix for the purpose of controlling a laminate thickness as disclosed by Anderson '097. Neither are the spheres incorporated into the composite matrix to provide insulative characteristics as with Anderson '097. Moreover, from a formular point of view, from a chemical reactivity point of view, and from an acoustic point of view, the teaching of Anderson's '097 (see column 34, lines 24-30, for example) are far from being relevant to Beck '372 or the subject matter of rejected claims 1, 2, and 4. In particular, the Examiner cites Anderson '097 for its teaching of hollow spheres having a diameter less than 500 microns to provide the specific laminate thickness bond.

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It is respectfully submitted that reliance on Anderson '097, in order to cure the above noted deficiencies of Beck '372, is inappropriate and improper in several respects. First, the hollow spheres according to the presently claimed invention are incorporated into the matrix of the three layers of laminate for three distinctive purposes, all of which are different and for reasons other than the insulative properties as described by Anderson '097. In addition, the use of hollow spheres, according to the presently claimed invention, is to provide three primary functions, none of which refer to "control of laminate thickness".

The Applicant respectfully submits that if Anderson '097 were to include spheres having a diameter which is disclosed in the current application, at the percent specified in Anderson '097 specification, the cementous mixture according to that reference would have inadequate density, thereby making it substantially impossible to work with the cementous mixture at the percentage specified. Furthermore, the cementous mixture would be rendered mechanical and dynamically unstable and unable to withstand the associated stresses, i.e., It is respectfully submitted that the cementous mixture, once hardened, would be too brittle.

Anderson '097 would have to increase the specified percent of glass spheres from 28.57% to above 55% in order to obtain the same cementous consistency with the K-factor of 0.036 W/m K as disclosed. As a result, this would lead to a significant increase in density from 0.304 g/cc to approximately 0.55 g/cc, i.e., it is respectfully submitted that the cementous mixture would be very difficult, if not impossible, to work with.

Furthermore, it is noted that careful selection of the chemical composition can greatly enhance the bond between the adhesive matrix and the surface of the glass spheres, and by bridge a path between the surface of the hollow spheres and the interstitial grains of the laminate. The teaching of Anderson '097 provides durable strength by forming a cement-like mixture of a given thickness which provides a durable structure via formation of a bulk aggregate. However, it is respectfully submitted that this composition is vulnerable to cracks and crack propagation under thermal, dynamic or shock-induced stresses. The composition, as recited in the pending claims, produces chemical-based bonding, resulting from reactions

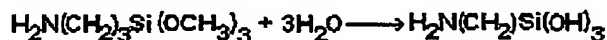
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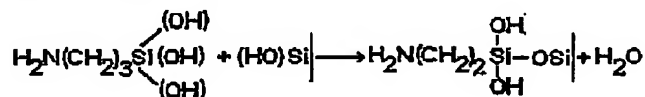
between the surface of the hollow sphere and the adhesive matrix, on one hand, and the surface of the hollow spheres and the adhesive-filled porous grain of the wooden structure (the substrate), on the other hand, as illustrated in Figure 3 below.

Figure 3
Coupling of Gamma-APTES to a Substrate

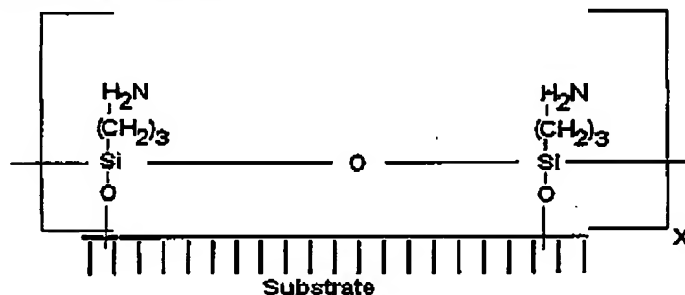
Hydrolysis Reaction



Bond Formation



Polysiloxane Formation



As a result of the above, the presently claimed invention results in an improved laminated composite structure for producing a high acoustical performance instrument which has noticeable sound improvements, e.g., improved acoustic resonance, improved sustained sound, improved sound amplitude, and improved structural integrity, over prior art drum and string instruments. The improved acoustical performance has (a) improved dimensional stability for the laminated composite structure as well as (b) improved longevity and performance stability for the laminated composite structure. As previously indicated, the improved longevity and performance stability of the laminate are a result of not only a creation

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of the internal equilibrium within the structure, but also, due to the selection of the additive type, the quantity and *most importantly, the particle size for the hollow spheres contained within the laminate*, namely, where all of the hollow spheres in the composite adhesive have a diameter of less than 500 microns, as presently recited.

In view of the forgoing, since neither Beck '372 nor Anderson et al. '097 in any way teach, suggest or disclose that above noted distinctions, namely, a composite structure with at least first, second and third layers of laminate with an adhesive layer located between the first and second and the second and third layers of laminate and the adhesive layer is a colloidal composite adhesive in which all of the hollow spheres in the composite adhesive have a diameter of less than 500 microns. Accordingly, it is respectfully submitted that the raised obviousness rejection, in view Beck '372 and/or Anderson et al. '097, should be withdrawn at this time.

Next, claims 5 and 10 are rejected, under 35 U.S.C. § 103(a), as being unpatentable over Beck '372 in view of Seal '568 and Anderson et al. '097; claim 3 is rejected, under 35 U.S.C. § 103(a), as being unpatentable over Beck '372 in view of Meteer et al. '642, while claims 6-9 are rejected, under 35 U.S.C. § 103(a), as being unpatentable over Beck '372 in view of Anderson, et al. '097, Janes et al. '527 and Aldinolfi '551. The Applicant acknowledges and respectfully traverses all of these additionally raised obviousness rejections in view of the following remarks.

The Applicant acknowledges that the additional references of Seal '568, Meteer et al. '642, Janes et al. '527 and Aldinolfi '551 may arguably relate to the features indicated by the Examiner in the official action. Nevertheless, the Applicant respectfully submits that the combination of the base references of Beck '372 and Anderson et al. '097 with this additional art of Meteer et al. '642, Anderson, et al. '097, Janes et al. '527 and Aldinolfi '551 still fails to in any way teach, suggest or disclose the above distinguishing features of the

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presently claimed invention. As such, all of the raised rejections should be withdrawn at this time in view of the above amendments and remarks.

In order to emphasize the above noted distinctions between the presently claimed invention and the applied art, the independent claims of this application now recite the features of "[a] composite structure comprising: at least a first layer of laminate, a second layer of laminate and a third layer of laminate; and an adhesive layer located between the first and the second layers of laminate and between the second and the third layers of laminate; wherein the adhesive layer, located between the first and the second layers of laminate and between the second and the third layers of laminate, is a colloidal composite adhesive which has a plurality of hollow spheres intermixed within the composite adhesive to facilitate improving bonding between adjacent layers of the laminate, and all of the hollow spheres in the composite adhesive have a diameter of less than 500 microns." Such features are believed to clearly and patentably distinguish the presently claimed invention from all of the art of record, including the applied art.

If any further amendment to this application is believed necessary to advance prosecution and place this case in allowable form, the Examiner is courteously solicited to contact the undersigned representative of the Applicant to discuss the same.

In view of the above amendments and remarks, it is respectfully submitted that all of the raised rejection(s) should be withdrawn at this time. If the Examiner disagrees with the Applicant's view concerning the withdrawal of the outstanding rejection(s) or applicability of the Anderson et al. '097, Beck '372, Seal '568, Meteer et al. '642, Janes et al. '527 and/or Aldinolfi '551 references, the Applicant respectfully requests the Examiner to indicate the specific passage or passages, or the drawing or drawings, which contain the necessary teaching, suggestion and/or disclosure required by case law. As such teaching, suggestion and/or disclosure is not present in the applied references, the raised rejection should be withdrawn at this time. Alternatively, if the Examiner is relying on his/her expertise in this field,

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the Applicant respectfully requests the Examiner to enter an affidavit substantiating the Examiner's position so that suitable contradictory evidence can be entered in this case by the Applicant.

In view of the foregoing, it is respectfully submitted that the raised rejection(s) should be withdrawn and this application is now placed in a condition for allowance. Action to that end, in the form of an early Notice of Allowance, is courteously solicited by the Applicant at this time.

The Applicant respectfully requests that any outstanding objection(s) or requirement(s), as to the form of this application, be held in abeyance until allowable subject matter is indicated for this case.

In the event that there are any fee deficiencies or additional fees are payable, please charge the same or credit any overpayment to our Deposit Account (Account No. 04-0213).

Respectfully submitted,



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